Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)

REG.NO.:

SLOT: C1

SCHOOL OF COMPUTER SCIENCE AND ENGINEERING
CONTINUOUS ASSESSMENT TEST - II
WINTER SEMESTER 2025-2026

Programme Name & Branch : **B.Tech. Computer Science and Engineering and Business Systems**
Course Code and Course Name : **CBS3001 - Computer Networks**
Faculty Name(s) : **Dr. K. Sudhakar**
Class Number(s) : **VL2025260502083**
Date of Examination : **17/03/2026**
Exam Duration : **90 minutes** **Maximum Marks: 50**

General instruction(s):

- Answer All Questions
- M - Max mark; CO – Course Outcome; BL – Blooms Taxonomy Level (1 – Remember, 2 – Understand, 3 – Apply, 4 – Analyse, 5 – Evaluate, 6 – Create)
- Course Outcomes
  CO3: Implement various error detection and correction mechanisms, flow control mechanisms and various routing
  CO4: Design subletting and analyse the performance of network layer, Construct and examine various routing protocols

Q. No	Question	Module	Marks	CO	BL
1.	A computer network uses the Go-Back-N ARQ protocol for reliable data transmission. The sender window size is 4, allowing it to transmit four frames without waiting for acknowledgments. In one transmission cycle, the sender sends frames 0, 1, 2, and 3 consecutively. During transmission, frame 2 is lost due to noise in the communication channel. However, frames 0, 1, and 3 reach the receiver. As per the Go-Back-N protocol rules, the receiver only accepts frames in order and discards any out-of-order frames. Based on this scenario, answer the following: 1. Draw the flow diagram of this communication (3 marks) 2. Explain how the receiver will respond when frame 3 arrives after frame 2 is lost. What acknowledgment will be sent and why? (2 marks) 3. Describe the actions taken by the sender after detecting the loss of frame 2. Which frames will be retransmitted? Justify your answer. (2 marks) 4. Analyze why the Go-Back-N protocol may result in bandwidth wastage in this situation. Support your explanation with reference to the retransmission mechanism. (3 marks)	3	10	3	3
2.	A company is designing a wired Local Area Network (LAN) based on the CSMA/CD protocol, similar to that used in Standard Ethernet. The network has the following characteristics:	3	10	3	3

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	Channel bandwidth = 100 Mbps Maximum propagation delay between the two farthest stations = 22.8μs Jamming signal transmission time is ignored For proper collision detection, the frame transmission time must be at least twice the maximum propagation delay. As a network engineer, you are required to analyse the system and justify the minimum frame size requirement. Answer the following: 1. Derive the expression relating frame transmission time and propagation delay for collision detection in CSMA/CD. (2 Mark) 2. Calculate the minimum frame transmission time required to ensure reliable collision detection. (2 Mark) 3. Determine the minimum frame size in bits for this network. (2 Mark) 4. Convert the calculated frame size into bytes. (1 Mark) 5. Explain in detail why this minimum frame size is necessary in CSMA/CD networks and what problem may occur if a smaller frame size is used. (3 Mark)				
3.	A multinational company connects its headquarters in Delhi to its branch office in Singapore using a digital circuit-switched network. The network has the following characteristics: • Data rate = 5 Mbps • Total bits exchanged during setup phase = 4,000 bits • Total bits exchanged during teardown phase = 4,000 bits • Distance between the two offices = 6,000 km • Propagation speed in the medium = 2×10^8 m/s • Ignore processing and queuing delays. Answer the following: (a) Calculate the propagation delay between the two offices. (b) Calculate the total setup delay. (c) If 50,000 bits of data are transmitted during the data transfer phase, calculate: • Transmission delay • Total data phase delay • Overall total delay (including setup and teardown) (d) If instead 5,000,000 bits are transmitted, calculate the new total delay. (e) Compare both cases and explain how data size affects the efficiency of circuit switching.	4	10	4	3
4.	a) A small company is assigned the IPv4 address block 215.26.37.42/28 for its internal network. The company wants to assign addresses to several computers and network devices.	4	10	4	3

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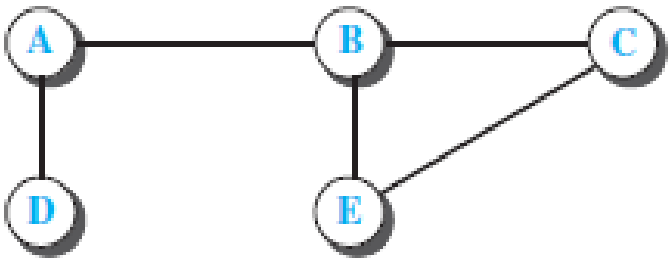
	Explain how the company can determine the network address, first usable address, last usable address, and broadcast address from this block. (4 marks) b) A router receives an IP datagram of 4000 bytes (including a 20-byte header). The datagram must pass through a network where the Maximum Transmission Unit (MTU) is 1500 bytes. Questions: a) Determine the maximum data size that each fragment can carry. b) Calculate the number of fragments created. c) For each fragment, determine: Total length, Fragment offset and MF (More Fragment) flag value d) Construct a fragmentation table showing all fragments generated by the router. (6 Marks)				
5.	A network contains five routers (A, B, C, D, E) connected with the following link costs are A-B=5, A-D=3, B-C=2, B-E=1, C-E=4  Routers exchange routing information periodically. a) Construct the initial distance vector table for router E (1 Mark). b) After receiving updates from its neighbours, compute the updated costs from E to C and E to A. (2 Marks) c) Determine the final least-cost paths from router E to all other routers. (2 marks) d) Construct the final routing table for all routers (5 Marks).	4	10	4	3

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